Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/738
FINLAND
February 1964
Original: ENGLISH

Confidential until official release during Conference

Abstract

Radioactive Food Chains in Arctic Regions

Jorma K.Miettinen
Department of Radiochemistry
University of Helsinki

Investigations of bioenvironmental radioactivity in the arctic regions of Scandinavia and Alaska have revealed radionuclide food chains effecting high body burdens of strontium-90 and caesium-137 in animals and man. The most important of these food chains leads from lichens through reindeer to man and causes in reindeer-breeding Lapps and Eskimos up to one-hundred times higher body burdens of caesium-137 than the northern hemisphere average.

For the elucidation of the arctic food chains the Finnish Atomic Energy Commission-sponsored field investigation called "Project Lapland" was started in 1960. In that year a dietary survey of the Finnish Lapps was carried out, which involved about one-third of the Lapp population in Finland. [1] On the basis of the results of that survey a scheme for regular sampling of forage plants and of milk and tissues of reindeer and cow was made. Analyses of strontium-90 and caesium-137 in the biological samples collected from the Finnish Lapland in 1960-61 made it possible to elucidate the essential factors affecting the accumulation of these nuclides in man's diet. [2], [3]

In summer 1961 Dr.L.Lidén of the Radiation Physics Department, University of Lund, developed a semi-portable whole body counter [4] and carried out an investigation in the Jokkmokk area, Swedish Lapland, in which the body burden of caesium-137 in a large group of Swedish Lapps and other inhabitants was determined. [4] One month later a similar investigation including also a detailed study of the dietary sources and levels of caesium-137 was carried out in the Finnish Lapland as a Finnish-Swedish joint study. [5] These studies elucidated the body burdens of caesium-137 and its seasonal variations in the different population groups

in the most important Swedish and Finnish Lapp areas. [5]

In spring 1962 a more elaborate mobile whole body counter, installed in a heavy truck, was developed by the author's laboratory. [6] With this unit a larger survey, including medical and clinical investigations, was carried out in all Finnish Lapp areas in May 1962, followed by more limited surveys in September 1962 and March 1963 [7]

With semi-mobile or mobile units of the same type large field investigations were also carried out by the Hanford Laboratory of the U.S. Atomic Energy Commission in Alaska in summer 1962 [8] and by the Radiation Physics Department of Lund University in the Swedish Lapland in April 1963. [9] In summer 1962 and 1963 our laboratory included in its "Project Lapland" an extensive investigation of hydrospheric food chains, since high concentrations of caesium-137 had been observed in fresh water fish in Lapland. [10]

The results of the Scandinavian investigations will be reviewed and compared with those of the Alaskan "Project Chariot".

[1] JOKELAINEN,A., PEKKARINEN,M., ROINE,P. and MIETTINEN,J.K. Z.Ernährungswiss.3 (1962) 110.

[2] PAAKKOLA,O. and MIETTINEN,J.K., Ann.Acad.Sci,Fennicae, Ser.A II, Chemica, No 125 (1963).

[3] SALO, A. and MIETTINEN,J.K., unpublished.

[4] NAVERSTÉN,Y.,McCALL,R.C. and LIDÉN,K. Acta Radiol.Ther.1(1963)190.

[5] MIETTINEN,J.K., JOKELAINEN, A., ROINE, P., LIDÉN, K. and NAVERSTEN, Y., Ann.Acad.Sci.Fennicae, Ser.A II, Chemica, No 120 (1963)

[6] IAEA, World Directory of Whole Body Counting Facilities, in print.

[7] MIETTINEN. J.K., paper read at the 3rd Symposium of Radioactivity Investigations in Scandinavia, Lund, Sweden, May 1963.

[8] PALMER, H.E., HANSON, W.C., GRIFFIN, B.I. and ROESCH ,W.C., Science 142 (1963) 64.

[9] LIDÉN, K., personal communication.

[10] HÄSÄNEN, E. and MIETTINEN, J.K., Nature (London), 200 (1963) 1018.